Small Business Innovation Research/Small Business Tech Transfer

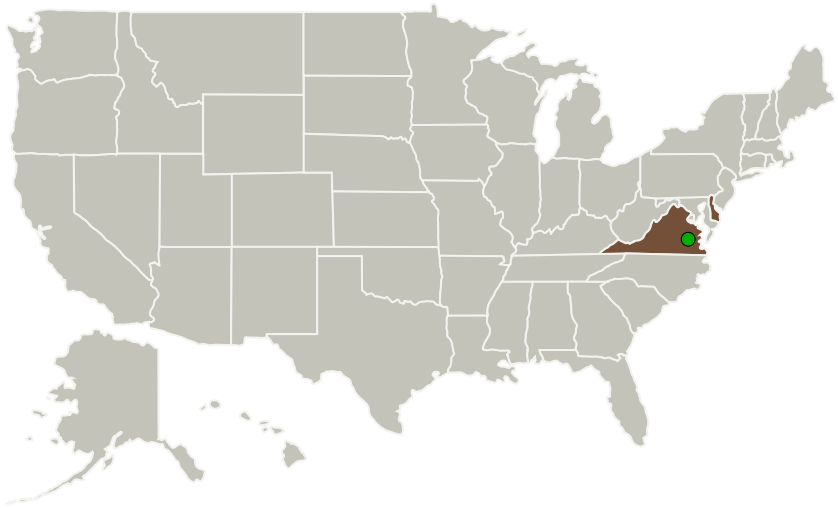
A New Architecture for FUN3D on Modern HPC Systems, Phase I

Completed Technology Project (2017 - 2017)

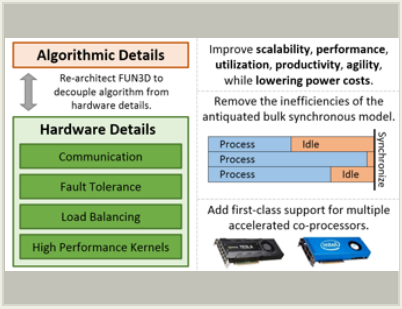
Project Introduction

The goal of this project is to refactor NASA's FUN3D computation fluid dynamic (CFD) simulation code to enable it to take full advantage of accelerator hardware available on modern hybrid computing environments. We will rearchitect FUN3D to take advantage of HPC tools we are currently building for NASA Goddard, using a dynamically-scheduled, task-based approach, with the goals of improving scalability, performance on the CPU, and the amenability to accelerators current and future. In Phase I, the focus will be on proving the validity and applicability of our approach for a given subset of FUN3D code. To meet this goal, we have identified two primary objectives for Phase I: rearchitect FUN3D and develop a prototype demonstrating feasibility. This will decouple the science being performed from the intricacies of implementations on a variety of platforms. In Phase II, we will build off this work to create a full accelerated solver for ongoing use. Once complete, the full solver will be efficient on today's hardware and easily adaptable to future systems.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
EM Photonics, Inc.	Lead Organization	Industry	Newark, Delaware
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia



A New Architecture for FUN3D on Modern HPC Systems, Phase I Briefing Chart Image

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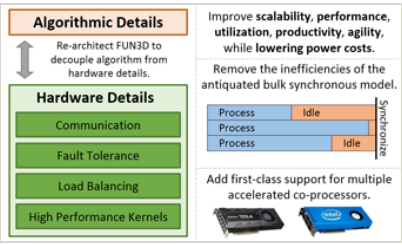
Primary U.S. Work Locations	
Delaware	Virginia

Images



Briefing Chart Image
A New Architecture for FUN3D on Modern HPC Systems, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/132258)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
EM Photonics, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

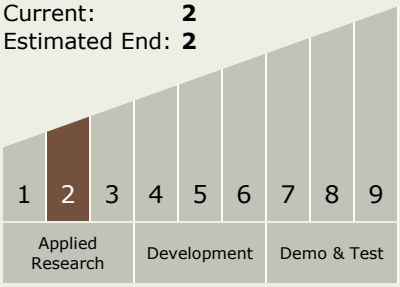
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Paul A Fox

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **2**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.6 Ground Computing
    - TX11.6.2 Automated Exascale Software Development Toolset

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System